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Oxidative Decoupling Transfer: The influence of copper oxidation on CVD graphene transfer

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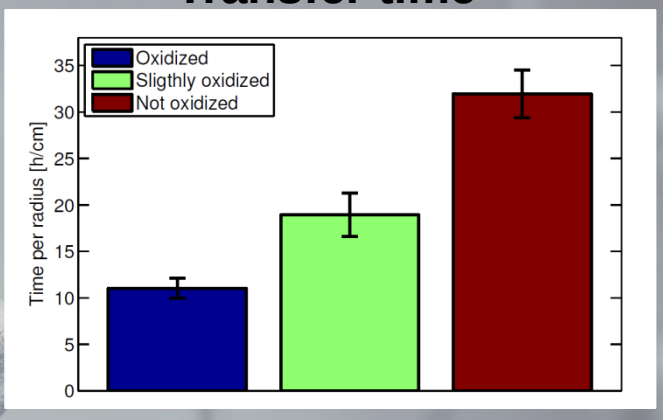
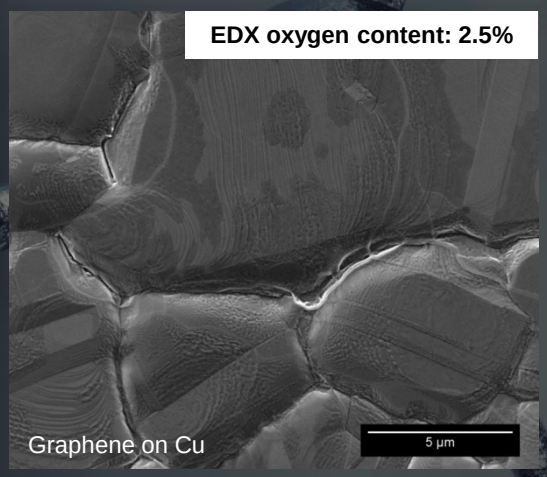
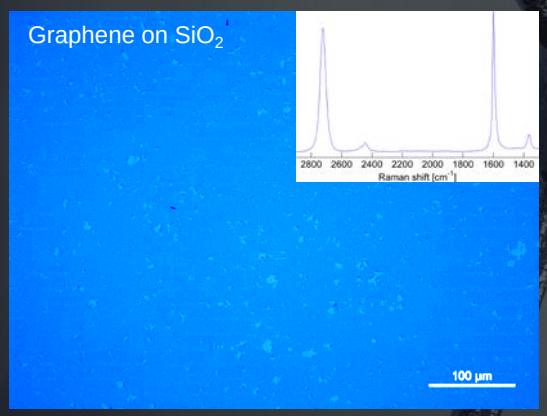
Graphene can be produced by chemical vapor deposition on Cu, but must then be transferred to target substrates such as silicon dioxide in order to be useful for applications. The goal is to reduce the number of defects, cracks and contaminants introduced by the transfer process.
A recently developed Oxidative Decoupling Transfer (ODT) method for transferring CVD graphene delaminates a graphene/polymer layer from Cu substrates by an electrochemical induced, slow oxidation of the Cu surface (manuscript in preparation).
Our hypothesis is that a key factor for the transfer process is the pre-existing oxidation of the Cu substrate that occurs when the sample is left in air before transfer. Here, we present a study of how Cu oxidation influences the ODT process as well as the quality of the transferred graphene layer.

Transfer time

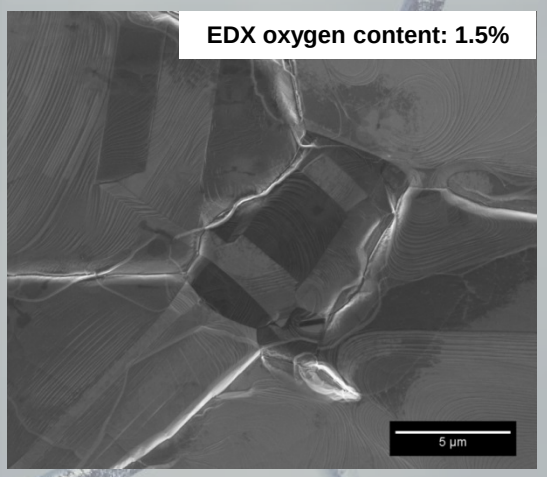


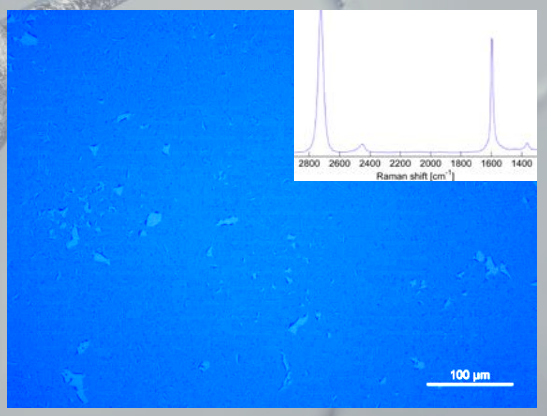
Oxidized Cu



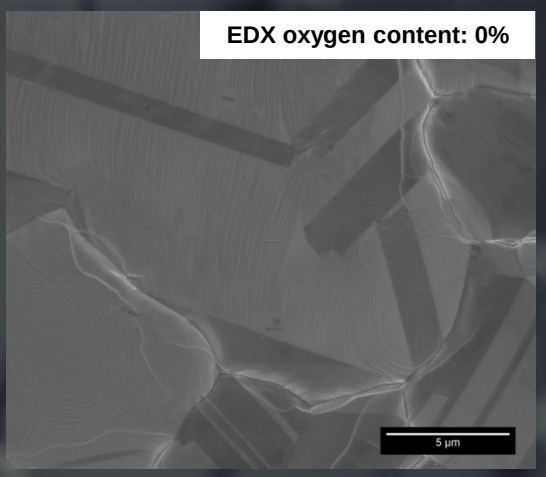


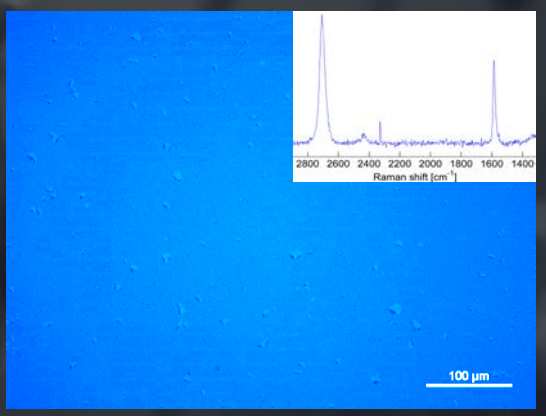
Slightly oxidized Cu





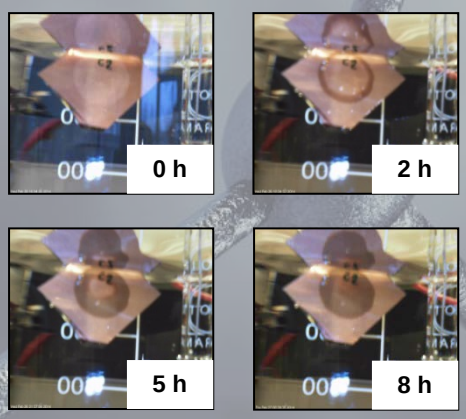
Not oxidized Cu





Transfer process

At applied potential of -0.4 V



Conclusions:

- High quality graphene was obtained
- The transfer process proceeded faster when the Cu surface was oxidized before transfer
- The transfer from the oxidized samples to the SiO_2 substrates lead to more optically discontinuous graphene layers
- The quality of graphene transferred with the ODT method depends critically on the treatment of the sample after graphene growth
- Possibility for multiple use of Cu catalyst wafers for graphene growth and transfer.

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